

Instructor
Hossain Ahmed

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Office Location
NFSC, 1009

Student Hours
10:00 -11:00 am, Monday
11:00 am – 1:00 pm,
Tuesday

**Class Time
and Location**
Monday: 1:30 - 2:20 pm
Wednesday: 12:30 – 1:20
pm
Friday: 11:30 – 12:20 pm

Location: KC 1018A



ST. FRANCIS XAVIER
UNIVERSITY

Subject Name: Phys 250, Winter 2024 Medical Imaging

Course Overview

Medical imaging of the human body is an indispensable part of modern science and technique. It provides inner and specific information about a body part that requires diagnosing or treating a medical condition. This course examines the fundamental principles of medical imaging, e.g. radiography, CT, ultrasound, MRI, emission tomography, etc. The basic physical concepts behind the interactions of light with matter, the production of X-rays and radioactivity will be introduced. Technical parameters important to all forms of diagnostic imaging, such as image quality and data processing, will be addressed. Three credits

Additional Course Information

Class participation, textbook consultation, doing assignments, and participating in-class quizzes are the key to success in this course. Class attendance is strongly recommended, and students are responsible for collecting information from the classes.

Learning Objectives

By the end of this course, students will be able to:

- Explain light, matter, their interaction, image quality, data, and their storage.
- Categorize different diagnostic radiology.
- Demonstrate how the radiation is detected and measured.
- Accurately describe the response of body parts exposed to radiation and their protections.

Evaluations

Category	Weight
Class Activities	5%
Assignments (4)	16%
Quizzes (3)	15%
Midterm	20%
Final	44%
Total	100%

There are four assignments and three in-class quizzes throughout the semester. Solving assignment questions and participating in-class quizzes will significantly help you to succeed in the course. Discussion with other students on assignment questions is always welcomed but make sure you can do the problems yourself as all in-class exams are closed books, and you will be working on exams yourself. Late submission without a valid reason will affect your grade, e.g. 10% cost for a single day delay and 100% cost for a week or so delay!

	Assignment	Assignment	
	Handing out	Due	Quiz
01	Jan. 17	Jan. 24	
02	Feb. 02	Feb. 09	Feb. 12
03	Mar. 08	Mar. 15	Mar. 18
04	Mar. 27	Apr. 03	Apr. 05

Exams:

Quizzes: In class

Midterm: February 16, 2024 (Friday) [Time: 11:30 am – 12:20 pm]

Final: The final exam date will be set by the University registrar.

Method of Instruction

- Face-to-face at KC 1018A
- Online (if necessary): <https://ca-lti.bbcollab.com/collab/ui/scheduler/session>

Course Schedule

Note: Based on time and situation, we might include or discard some of the contents in the table below.

Week/Date	Topic	Assignment (Reading, Exercises, Hand-in Assignment) and Quiz
Week 1 – 3	Module 1: Basic physical concepts <ul style="list-style-type: none">■ Introduction to Medical Imaging■ Light and atoms■ Light-matter interaction■ Notion of image quality■ Data storage and processing	<ul style="list-style-type: none">■ Assignment one■ Quiz one
Week 4 - 8	Module 2: Diagnostic radiology <ul style="list-style-type: none">■ X-Ray production■ Radiography■ Mammography■ Fluoroscopy■ Computed tomography (CT)■ Magnetic resonance imaging (MRI)■ Ultrasound	<ul style="list-style-type: none">■ Assignment two■ Quiz two
Week 7	Study break	
Week 9 & 11	Module 3: Nuclear medicine <ul style="list-style-type: none">■ Principle of radioactivity■ Radionuclide production■ Radiation measurement and detection■ Nuclear imaging and emission tomography	<ul style="list-style-type: none">■ Assignment three■ Quiz three
Week 12	Module 4: Radiation protection	<ul style="list-style-type: none">■ Assignment four
Week 13	Module 5: Artificial intelligence and diagnostic	

Course Materials & Resources

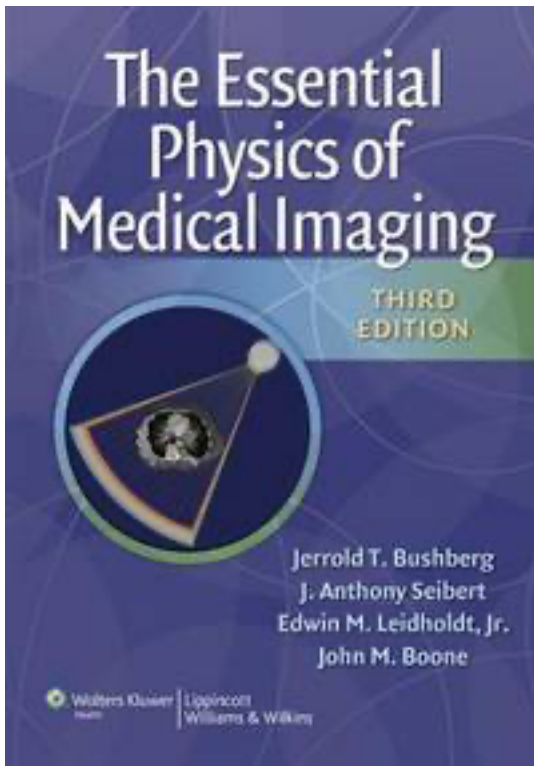
Besides in-class lectures, the course webpage (Moodle page) is the primary source of the course materials. Lecture slides, assignments, quizzes, and solutions (if any) will be uploaded to the Moodle page accordingly. To avoid any biases, I usually upload lecture slides after my in-class lectures. Any announcements, formula sheets, practice problems (if any), and other materials (if any) will also be uploaded on Moodle page. Students are strongly advised to follow the

Course webpage: <https://moodle.stfx.ca/course/view.php?id=32848>

Required Text(s)

The Essential Physics of Medical Imaging (Third Edition) by Jerrold T. Bushberg, J. Anthony Seibert, Edwin M. Leidholdt, Jr, and John M. Boone

Available in the StFX Bookstore



Academic Integrity

The university has a strict policy against academic dishonesty. For a precise definition of what St. Francis Xavier University considers to be academic dishonesty, please refer <https://www.stfx.ca/applications-admissions/registrars-office/academic-integrity>. It is your responsibility to know what constitutes academic dishonesty.